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COMPLETE SPECIFICATION

Production of Meat Emulsions

We, THE GRIFFITH LABORATORIES, LIMITED, a corporation organized and existing under the laws of the Dominion of Canada, of 109—117 George Street, City of Toronto, Province of Ontario, Canada, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the production of meat emulsions, such as are commonly used in sausage and other encased meat products.

It has long been known that mild acidity is favorable to cured meat products, and especially to the color and permanence thereof. Fresh meat, in general, is mildly acid and has a natural pH in the range 5.8 to 6.3. The term "meat" as used herein comprehends lean and fat, and the meat used for emulsions always consists of lean and fat. The so-called emulsification of meat is the physical incorporation of the fat content as dispersed finely divided particles with protein of the lean functioning as a part of, or as all of, the dispersing agent, with or without the presence of visual particles of lean meat.

Cured meat emulsions are more commonly made from mixtures of meat with a curing salt composition containing alkali metal nitrite with or without alkali metal nitrate. The cured products have a bright red color, the stability of which is important where the cured product is offered for sale. In particular, as exposed to light, the red color of curing, even after it is fixed by heat, as in smoking encased products, changes to a gray-brown which is unattractive to purchasers.

It is known that the water-binding capacity and the emulsifying qualities of the meat protein are related to the pH of the meat composition, and both are better, the higher the pH. In the pH range of 5.5 to 5.8, the said properties of the meat protein are appreciably lower than in the pH range of 6.0 to 6.2. The addition of certain alkali-metal salts of phosphoric acid is frequently practised to neutralize the lactic acid of the meat and raise the pH to increase the water-binding capacity and emulsifying property. In consequence, edible acid has not been commercially employed in processing cured meat compositions to be emulsified, even though its contribution to color and stability of color may be beneficial.

The present invention aims to produce meat emulsions for a variety of meat products, which emulsions spontaneously increase in acidity after emulsification, and thereby provide a final meat emulsion containing free edible acid and having a pH lower than that prevailing during emulsification.

The present invention is based on the discovery of an edible agent which may be present in a meat composition being emulsified or to be emulsified, without adversely lowering the pH thereof during the emulsification process. The agent is an edible lactone which in the presence of water hydrolyzes forming edible organic acid. The agent is glucono delta lactone which readily, but sufficiently slowly, hydrolyzes to form gluconic acid.

In a method of producing a meat emulsion according to the invention, immediately prior to or during the emulsification of the meat, there is added at least one part by weight of glucono delta lactone per 3200 parts of meat whereby gluconic acid forms thereafter in the resulting emulsion by hydrolysis of the glucono delta lactone.

The invention also consists in the meat emulsion produced by the method of the invention, and in a dry comminuted composition for use in practising the method of the invention comprising dry comminuted stabilised glucono delta lactone and an edible material which has a greater readiness to absorb moisture than the glucono delta lactone.

It has been found that when said lactone

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is added to a meat mass to be emulsified, the spontaneous hydrolytic generation of acid is so retarded that the mass may be emulsified in a time-controlled period to yield substantially the same quality of emulsion as does the same meat mass without adding the lactone. After the emulsion is formed, the generation of edible acid in it does not alter the initial quality of the emulsion, since by that time the fat has been subdivided to fine particles encased by protein. For example, a meat mass containing freshly added glucono delta lactone, and a similar mass containing an equivalent amount of gluconic acid yield, when both are quickly emulsified in about 20 minutes, relatively and respectively, excellent and poor emulsions, yet in about three hours, after completing the emulsion, they both have the same pH, and the same content of gluconic acid.

At about 5°C., the hydrolysis of glucono delta lactone takes place at substantially the same rate in water and in a 5% by weight solution of sodium chloride, the latter being chosen because sodium chloride is commonly present in meat emulsions. TABLE I shows the titrations of two solutions, containing the same amount of glucono delta lactone (hereinafter referred to as GDL). To 100 ml. of water and to 100 ml. of a 5% solution of sodium chloride, were added 300 mg. of GDL, and then the two were titrated with 0.1N solution of sodium hydroxide.

TABLE I

	ml. 0.1N NaOH	
Time	Water	NaCl
10 minutes	3.2	2.6
1 hour	7.8	7.5
3 hours	10.8	11.1

TABLE I shows that approximately 25% of the lactone hydrolyzes in the first ten minutes, and the remainder hydrolyzes more slowly over a three-hour period. Conventional apparatus for forming emulsions are used to emulsify in as short a time as one minute and as long a time as twenty to twenty-five minutes. The GDL or a composition containing GDL is preferably added last to a composition to be emulsified and then the emulsification is carried out as promptly as possible, and preferably in a period short of twenty-five minutes, thus to minimize an adverse content of free acid during the emulsification.

The meat mass to receive the subject agent may be any of the known compositions to produce meat emulsions. In nitrite cured products colour stabilizing benefits are obtained from the final presence of gluconic acid when there is also present an ene-diol compound, such as reductone, dihydroxymaleic anhydride, d-glucoascorbic acid, ascorbic acid and diisoascorbic acid, or any of their water-soluble salts, among which are the sodium salts and the calcium salts.

In carrying out the invention, the GDL is used only in small quantity—at least one part by weight per 3200 parts of meat. The quantity used may be added to the meat as a dry ingredient per se, or be included as a dry ingredient in a mixture of other dry ingredients, such as a mixture commonly used as a seasoning composition.

Although the preferred practice is to emulsify a comminuted meat mass containing GDL, it is to be understood that the meat mass to receive the GDL may be partially emulsified, or be a comminuted meat mass not as far advanced as an emulsion. The GDL, for example, may be added to the contents of a silent cutter at any stage, such as in its coarse comminuting stage, or its emulsifying stage. In the case of a slow-acting emulsification process, the GDL may best be added late in the process so that the final emulsification is completed in an appreciable time prior to the completion of the hydrolysis of the lactone, and preferably while a major portion of the GDL remains unhydrolyzed. In the case of a slow batch-processing in a silent cutter, the best results are effected by nearly completing the emulsification and then continuing the action by uniformly mixing into the contents the lactone. In the case of continuous processing in comminuting machines, or colloidal mills, the GDL is present in the composition continuously fed to the machine.

By simple procedure, the amount of GDL has been determined, which is equivalent to given amounts of various edible acids that are known and available for addition to meat compositions to be emulsified, or to meat

emulsions. 100 mg. of the materials to be compared were dissolved in 100 ml. of water, and titrated with 0.1N sodium hydroxide to attain a pH of 6. Before titrating the GDL, it was allowed to hydrolyze to equilibrium. TABLE II gives the titration values and the equivalency.

Column 1 is the material titrated to pH of 6.

Column 2 is the ml. used for the titration.

Column 3 is the calculated amount in parts by weight of the acid to be added to 1600 parts of meat to impart acidity equivalent to 4 parts of GDL.

TABLE II

1	2	3
Anhydrous citric acid	13.1	1.2
Lactic acid (85%)	8.0	1.95
Gluconic acid (50%)	1.75	9.0
Glucono delta lactone*	3.9	4

* Heated for two hours at 71° C.

The amounts of materials listed in TABLE II were then added to a test meat composition to be emulsified, and the emulsification effected in 10 minutes with a load of about 2.5 kilograms. At fixed time periods, after the 10-minute emulsification, the pH of the emulsion was determined. Sausage casings were stuffed with the emulsions and smoked. The pH after smoking and the shrinkage in smoking were determined as reported in TABLE IV, for which the test composition is given in TABLE III.

TABLE III

	Parts by Weight
Lean beef (pH 6.40)	60
Pork jowls (pH 6.00)	40
Chipped Ice	25
Sodium chloride	2.1
Curing salt	0.375
Sodium chloride 90%	
Sodium nitrite 6%	
Sodium nitrate 4%	
Spice Seasoning	0.75
Sodium isoascorbate	0.4

TABLE IV

Column 1 is item number.

Columns 2 and 3 are the test material and the parts by weight used for the compositions of Table III.

Columns 4 to 8 are the pH values of the emulsions at the minutes given, after the 10-minute emulsification.

Column 9 is the pH of the smoked sausage.
Column 10 is the percent shrinkage after smoking.

1	2	3	4	5	6	7	8	9	10
		Parts by weight	5 min.	30 min.	60 min.	120 min.	240 min.	—	%
1	None (Control)	—	5.85	5.90	5.85	5.58	5.80	6.05	6.08
2	GDL	0.25	5.80	5.75	5.70	5.65	5.60	5.85	6.55
3	Gluconic acid (50%)	0.56	5.65	5.60	5.60	5.65	5.62	5.85	7.05
4	Lactic acid (50%)	0.12	5.60	5.65	5.65	5.70	5.65	5.88	7.26
5	Citric acid*	0.075	5.58	5.66	5.65	5.65	5.68	5.90	7.78
6	Citric acid	0.075	5.58	5.60	5.65	5.60	5.65	5.88	10.59

* Note Special Discussion

In TABLE IV, the citric acid of item 5 was added immediately after completing the emulsification, and the same quantity in item 6 was added before emulsification. In both cases, the pH values are substantially identical, but the shrinkage is much greater in item 6, showing the adverse effect of emulsifying in the presence of the citric acid. The sausage of item 6 was soft and mushy and was eliminated from the following evaluation of color:

The smoked sausages were stored overnight at 7°C., and color values reported as follows:

Skin color: No. 1 is red with a slight brownish cast, and the remainder were pinkish-red.

Slice color: (a) Initially sliced, all had excellent color with No. 1 the least red. (b) After six hours exposure to light of 430 lux, the control turned brown, No. 2 with GDL was best, and Nos. 3, 4 and 5 were better than the control. (c) After overnight storage at 5°C., the relationship remained unchanged. (d) After three days storage at 5°C., the relationship remained unchanged.

There are other lactones suggested by the advantages derived from GDL. The rates of hydrolysis of other lactones at 7—10°C., 38°C. and 93°C. have been determined and it has been found that GDL is distinctive. In particular, gluconic lactone, gamma galactonolactone, glucuronolactone and alpha glucoheptonic lactone are too slow to hydrolyze. For example at 7° to 10°C., no appreciable hydrolysis takes place in water in 18 hours. At 38°C. and 93°C. some of these hydrolyze somewhat faster but to no advantage for the present invention.

The present invention basically concerns the pH of a meat composition during emulsification, which composition, after emulsification, has a lower pH and one such that had it prevailed during emulsification, the emulsion would be of poorer quality. As exemplified below, this result may be achieved in fresh or cured meat emulsions. Its value is greatest in cured meat emulsions wherein the texture and the red color of nitrite-curing and its stability are important commercial considerations in the merchandising of such products. In this field, the red color of nitrite-curing and its stability are well-known to be enhanced by various additives, in particular, an isomer of ascorbic acid or its edible salts, with or without a spice such as paprika.

The emulsification determines texture and yield, and the composition determines color and its stability. Although it is customary to emulsify compositions containing the curing agent, cured sausage products may be made by adding the curing agent to the finished emulsion. The present invention leads to improved texture with or without curing salt present, but to avoid a second mixing it is preferably carried out for cured meat products by including the nitrite curing salt before the emulsification. Mixing operations after emulsification lead to adverse effects from oxygen of the air, and are avoided unless carried out in vacuum chambers.

EXAMPLE 1.

See item 2 of TABLE IV using 0.25 parts of GDL to 100 parts of meat in the composition of TABLE III.

EXAMPLE 2.

Pork Sausage.

A meat mass for pork sausage was prepared as follows:

	Parts by Weight
Pork trimmings	100
Ice water	3
Sodium chloride	1.6
Spice seasoning	0.5

This was divided into portions A, B, C and D, for emulsification and comparative tests with additions as follows:

A Control
B 1 part of GDL per 3200 parts of meat.
C 16 parts of GDL per 3200 parts of meat.
D 38 parts of gluconic acid (50%) equivalent to 16 parts of GDL.

The pork trimmings were ground through a 1-inch plate, chilled, and then divided into four parts. Seasoning and salt, and a solution of GDL in the ice water, were added, and the whole comminuted through a 4.75 mm. plate and then stuffed into casings.

As stated times after the additions, pH values were measured as given in TABLE V below:

TABLE V

	pH at minute periods				
	5	30	60	120	240
A	5.8	5.7	5.6	5.8	5.7
B	5.9	5.7	5.8	5.7	5.6
C	5.55	5.6	5.4	5.4	5.3
D	5.1	5.2	5.2	5.2	5.2

The emulsion of D became very short and almost immediately assumed a gray color. The remaining emulsions were good quality and good color, 24 hours after preparation. Emulsion C in 4 hours converted its GDL to gluconic acid in quantity substantially the same as the quantity in emulsion D, and the final pH values were substantially the same. All but portion D remained at higher pH values during the period of emulsification, thus producing good quality emulsions.

EXAMPLE 3.

The following cured meat composition was employed:

	Parts by weight
Lean beef	40
Pork trimmings	60
Chipped ice	25
Sodium chloride	2.1
Curing salt	0.375
Sodium chloride 90%	
Sodium nitrate 6%	
Sodium nitrate 4%	
Spice seasoning	0.75
Test material as set out in following table.	

The composition, as varied in TABLE VI, was emulsified in about 10 minutes and promptly stuffed into casings and smoked.

TABLE VI

Example	Test Materials	Parts by weight	Color Development in Smokehouse		pH Sausage
			1st Hour	2nd Hour	
3a	Control	—	Brown overall	Red overall	5.95
3b	GDL	0.25	Reddish brown	" "	5.85
3c	GDL	0.5	More red than 3b	" "	5.80

These examples demonstrate that the use of GDL hastens the development of the red color of curing.

EXAMPLE 4.

The composition of Example 3 was used for the following comparisons:

TABLE VII

Example	Test Materials	Parts by weight	pH of sausage	Sausage color*
4a	None (control)		5.95	1
4b	Glucono delta lactone	0.25	5.80	1.5
4c	Glucono delta lactone	0.25	5.78	3
	Sodium isoascorbate	0.055		
4d	Glucono delta lactone	0.25	5.76	3
	Sodium ascorbate	0.055		
4e	Sodium ascorbate	0.055	5.98	2

* Higher number indicates better color.

The foregoing emulsions were made in 10-minutes in a silent cutter. The emulsions were stuffed into casings and placed in a smokehouse under conditions as follows:

1 hour at 71°C.
1 hour at 77°C.
1.5 hour at 85°C.

giving an internal temperature of 67°C. The smoked products were chilled in cold water to an internal temperature of 51°C., then tempered at room temperature of 24°C., for 30 minutes, then placed in a cooler at 7°C., for overnight storage. After the night storage, the sausage pH given above was determined.

Examples 4a and 4e, both without GDL, yield emulsions and finished sausage higher in pH than Examples 4b, 4c and 4d, which three examples have substantially identical pH values for the finished sausage.

The stability of the red color reported in the table above was tested by exposure by slices at 5°C., for 5 hours to light at 270 to 323 lux, and the colors designated B were compared. Then, the sausage slices at 5°C. were left for 5 additional hours, exposed to light at 270 to 325 lux, and the colors designated C were compared:

TABLE VIII

Example	Color B	Color C
4a	Gray	Very Gray
4b	Pink-gray	Slight pinkish cast
4c	Bright red	Red
4d	Bright red	Red
4e	Red	Slightly more pink than 4b

After three more days, the colors C of 4c and 4d retained a reddish cast while the other three were completely gray.

The presence of an excess of residual nitrite salt in cured meat products is objectionable under the regulations of some Governments. The nitrite salt in curing should be converted to nitroso-hemoglobin and nitroso-myoglobin. The lower the pH of the final product, in general, the less there is of residual nitrite salt. This would indicate the addition of edible acid, such as gluconic acid for example.

As shown above, the presence of such acid during emulsification leads to an emulsion of poor quality. When such acid is provided by initially using GDL according to the present invention, the final pH may be lowered without adverse effect on the emulsification. When this procedure is followed it has been found that the residual nitrite salt is lower than when the GDL is omitted. In other words, the residual nitrite salt may be reduced by creating a lower final pH after emulsification by the presence of GDL during emulsification.

The following examples illustrates:

EXAMPLE 5.

Bologna

	Parts by Weight
Lean beef	40
Pork trimmings	60
Chipped ice	25
Sodium chloride	2.1
Curing salt	0.25
Sodium chloride 90%	
Sodium nitrite 6%	
Sodium nitrate 4%	
Sodium isoascorbate	0.055
Glucono delta lactone	x

When x = 0, the residual sodium nitrite was 50 parts per million. When x = 0.25 parts, the residual sodium nitrite was 31 parts per million.

The invention may be carried out in other types of compositions. Examples 6, 7 and 8 illustrate curing compositions in which the quantities of ascorbic acid and glucono delta lactone are varied from zero upwardly.

When using ascorbic acid in a composition for a cured meat composition, the amount of ascorbic acid is insufficient appreciably to change the pH during the emulsification in the presence of glucono delta lactone. This is demonstrated in the following Tables IX and X:

TABLE IX

A composition to be emulsified:

	Parts by Weight
Lean beef (pH 6.40)	60
Pork jowls (pH 6.00)	40
Chipped Ice	25
Sodium chloride	2.1
Curing salt	0.25
Sodium chloride 90%	
Sodium nitrite 6%	
Sodium nitrate 4%	
Ascorbic acid	x
Glucono delta lactone	y
Spice Seasoning	0.75

These variations of the above composition were emulsified in less than five (5) minutes, and the pH values of the emulsion were taken as set periods after completing the emulsion as set forth in TABLE X.

TABLE X

EXAMPLE 6. The composition of TABLE IX in which x = zero
y = zero

EXAMPLE 7. The composition of TABLE IX

in which x = 0.047 part ascorbic acid
and y = zero (no lactone)

EXAMPLE 8. The composition of TABLE IX in which x = 0.047 part ascorbic acid
and y = 0.187 part glucono delta lactone

pH of Emulsion

Time in Minutes	Example 6	Example 7	Example 8
5	5.7	5.7	5.75
30	5.7	5.8	5.8
60	5.7	5.6	5.35
120	5.6	5.7	5.4

In the absence of the lactone in Examples 6 and 7, the pH of the finished emulsion remains substantially constant. In Example 8, the pH is reduced by hydrolysis of the lactone, which is substantially completed in from 1 to 2 hours, allowing the ascorbated-nitrite cure to proceed in a more acid emulsion than in Example 7:

Color is an important characteristic of the cured meat in incased meat emulsions. The presence of a member of the capsicum family as seasoning participates in forming the color and the color is improved and more lasting when the emulsion is formed in the presence of glucono delta lactone.

Red pepper and paprika are members of the capsicum family imparting certain color characteristics. Red pepper has pronounced bite as well as color, and paprika has pronounced color and little bite. Thus, color and bite, in a sausage, for example, may be varied greatly by variously mixing members of the capsicum family. This is done by selecting from ground natural forms and oleoresins derived therefrom.

The following is illustrative of the use of capsicum seasoning in variations of the usages of capsicum and of glocono delta lactone in the formula of TABLE XI.

TABLE XI

	Parts by Weight
Lean beef	65
Pork jowls	35
Chipped ice	25
Sodium chloride	2.5
Dry corn syrup solids (D.E. = 42)	2.0
Spice seasoning	0.5
Curing salt	0.25
Sodium chloride 90%	
Sodium nitrite 6%	
Sodium nitrate 4%	
Sodium isoascorbate	0.0625
Test material as set out in the following table	

The test compositions were emulsified promptly after the inclusion of GDL, and the emulsion stuffed into casings (40 × 4 cm.) and smoked as follows:

	1 hour at 71°C.
	1 hour at 77°C.
	3 hours at 82°C.
Total	5 hours to internal temperature of 67°C.

The test sausages were then chilled in cold water for 30 minutes to a temperature of 54°C., then, after 30 minutes at room temperature, were placed in storage at 70°C. overnight.

The following TABLE XII gives the composition of the test sausages and the pH after smoking.

TABLE XII

Example	Sausage No.	Test Material	Parts by Weight	Finished Sausage pH
9	1	Paprika	0.22	6.00
10	2	Paprika Glucono delta lactone	0.22 0.25	5.80
11	3	Oleoresin of paprika Dextrose carrier	0.211 0.5	6.00
12	4	Oleoresin of paprika Dextrose base Glucono delta lactone	0.211 0.5 0.25	5.8
13	5	Red pepper	0.125	6.00
14	6	Red pepper Glucono delta lactone	0.125	5.82

After the overnight storage slices of the sausages were exposed for seven hours to light of 270 to 323 lux., and those having GDL retained more color than the controls. They were then covered against the light and stored overnight, when they still showed more color than the controls. They were then exposed for eight hours to light of 270 to 323 lux, and the color then evaluated as shown in TABLE XIII.

TABLE XIII

Example	Sausage Slices	Coloring
9	No. 1	Brown with slight orange cast
10	No. 2	Red with the most orange cast
11	No. 3	Brown with slight yellow cast
12	No. 4	Red with slight orange cast
13	No. 5	Brown with slight yellow cast
14	No. 6	Red with slight orange cast

Then the slices were again covered from the light and stored overnight, and the color values remained as reported in TABLE XIII.

Although all the sausages of Examples 9 through 14 were made with sodium isoascorbate, the control members showed very little recovery of color after the fading by light exposure.

The combined effect of using the GDL and the capsicum was tested, both with and without the presence of an ene-diol compound. It was found that improvement in color is effected in both cases, however, more so when the ene-diol compound is present, as shown in Examples 15 through 18.

Using the meat composition and procedures set forth in TABLE XI, both omitting and including sodium isoascorbate, comparative compositions were produced as set forth in TABLE XIV, which gives the pH of the sausage after smoking.

TABLE XIV

Example	Sausage No.	Test material	Parts by weight	Finished Sausage pH
15	1	Paprika	0.25	6.20
16	2	Paprika Glucono delta lactone	0.25 0.25	6.00
17	3	Paprika Sodium isoascorbate	0.25 0.055	6.20
18	4	Paprika Sodium isoascorbate Glucono delta lactone	0.25 0.055 0.25	6.00

After the smoking, the sausages were chilled in water for 30 minutes to a temperature of 54°C., then placed in storage at 7°C. for 36 hours. Then slices of the sausages were cut and laid side by side on wax paper base and overwrapped with cellophane. The sovered slices were then exposed for 7 hours to light of 270 to 323 lux and color again evaluated as given in TABLE XV. They were then covered from light and stored overnight, and again evaluated as in TABLE XV.

TABLE XV

Example	Sausage slice	After light	After light and storage
15	No. 1 (Control)	Brown	Brown
16	No. 2	Reddish brown	Reddish brown
17	No. 3	More red than 2	Increased red over 2
18	No. 4	Most red	Reddest

The slices were then held for four additional days with exposure to light of 108 lux, and the colors remained substantially unchanged.

It is quite important that the glucona delta lactone be free from any substantial quantity of moisture. Therefore, inasmuch as it is also desirable to provide the material in highly comminuted form, it is preferred to form a dry comminuted composition by including with the stabilised glucono delta lactone edible material which has a greater readiness to absorb moisture than the glucono delta lactone. Examples of such edible material are paprika, sodium chloride, sugar, certain proteins and curing salt.

In the following exemplary compositions, the parts by weight are suitable for use with 1600 parts of meat.

TABLE XVI

Composition No.	Composition: 1	2	3	4	Parts by Weight 5	6	7
Glucono delta lactone	3	4	4	3	3	4	4
Sodium isoascorbate	0.75	—	—	—	0.75	—	—
Sodium chloride	1.25	—	—	1	13.75	—	—
Paprika	—	4	—	—	—	—	3
Sodium caseinate	—	—	44	—	—	—	—
Sodium proteinate*	—	—	—	—	—	44	—
Curing salt#	—	—	—	4	—	—	—
Anhydrous corn sugar	—	—	—	—	—	—	1
Spice seasonings**	—	—	—	—	Taste	—	—

* A soy protein, the product of United Kingdom Specification No. 852,053, i.e., the product of washing impurities from defatted soybean material, with water at a pH in the vicinity of its isoelectric point, the product thereafter being raised in pH to about 7 as sodium proteinate.

90% Sodium chloride, 6% Sodium nitrite, 4% Sodium nitrate.

**May include oleoresins of capsicum and paprika.

Compositions such as those given above should be prepared and maintained as dry compositions in order that any incidental moisture content in them as prepared, or acquired after preparation, is inadequate to effect appreciable loss of the lactone by hydrolysis. The maximum permissible amount of water varies with the composition, because some ingredients mold the moisture in a manner less effective on the lactone than others. Also, the maximum permissible amount for each composition varies with the prescribed period of storage for prescribed packaging and prescribed environment of storage.

WHAT WE CLAIM IS:—

1. A method of producing a meat emulsion in which, immediately prior to or during the emulsification of the meat, there is added at least one part by weight of glucono delta lactone per 3200 parts of meat whereby gluconic acid forms thereafter in the resulting emulsion by hydrolysis of the glucono delta lactone.

2. A method as claimed in claim 1, in which the meat is emulsified prior to completion of the hydrolysis of the lactone to gluconic acid.

3. A method as claimed in claim 1 or claim 2 in which the meat is emulsified prior to any substantial hydrolysis of the lactone.

4. A method as claimed in any one of claims 1, 2 or 3 in which the quantity of glucono delta lactone added is in the range from 0.5 to 8 ounces per one hundred pounds of meat.

5. A method as claimed in any one of the preceding claims, in which emulsification is carried out at a pH adapted for producing an emulsion of fine fat particles but in the presence of sufficient glucono delta lactone to lower the pH after completion of the emulsion to a level substantially below that first-mentioned higher pH necessary for producing said emulsion of fine fat particles.

6. A method of producing a meat emulsion as claimed in any of the preceding claims, in which the meat is emulsified in the presence of alkali metal nitrite and including the step of curing the meat in the emulsion in the presence of the gluconic acid generated in the emulsion from the lactone.

7. A method as claimed in claim 6, in which the meat to be emulsified in the presence of alkali metal salt contains, or has added to it, ene-diol compound such as reductone, dihydroxymaleic anhydride, d-glucoascorbic acid, ascorbic acid and di-isoascorbic acid, or any of their water-soluble salts, among which are the sodium salts and the calcium salts.

8. A method as claimed in claim 6 or

claim 7, in which the meat to be emulsified contains, or has added to it, capsicum seasoning material.

9. A method as claimed in claim 8, in which the seasoning material comprises paprika.

10. A method as claimed in claim 9, in which the seasoning material comprises ground paprika or oleoresin of paprika.

11. A method of producing a meat emulsion substantially as described herein.

12. A meat emulsion produced by the method of any one of the preceding claims.

13. When used in the method of any one of the preceding claims 1 to 11, a dry comminuted composition which includes comminuted stabilised glucono delta lactone and edible material which has a greater readiness to absorb moisture than the glucono delta lactone.

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